WE CLAIM:

1. A method of determining the position and emission rate of at least one source of emanations into an intervening medium, which method comprises:

(a) selecting a set of measurement locations;

(b) measuring the concentration of the emanations in the intervening medium at the measurement locations thereby providing a set of observed data;

(c) measuring the velocity of the intervening medium at a location;

(d) postulating a dispersion model that allows the calculation for a position of the concentration of the emanation arising there from a source;

(e) postulating a set of source models comprising source parameters;

(f) calculating with the dispersion model for each postulated source model the concentration that would arise at the measurement location(s) thereby providing a set of synthetic data for each postulated source model;

(g) comparing the set(s) of synthetic data with the observed data thereby obtaining the source model that gives the closest fit; and

(h) outputting the position and emission rate of the at least one source assumed in the source model that gives the closest fit,

wherein the concentrations of the emanations are measured by point measurements using an ultra-sensitive detector.

2. The method of claim 1 wherein the source parameters comprise the position(s) of assumed source(s) and assumed emission rate(s).

3. A method of remotely determining the position of a hydrocarbon reservoir located in an earth formation, which method comprises:

(a) selecting a set of measurement locations;

(b) measuring the concentration of a selected component in the atmosphere at the measurement locations thereby providing a set of observed data;

(c) measuring the wind velocity at a location;

(d) postulating a dispersion model that allows the calculation for a position of the concentration of the selected component arising there from a source;

(e) postulating a set of source models comprising source parameters;

(f) calculating with the dispersion model for each postulated source model the concentration that would arise at the measurement location(s) thereby providing a set of synthetic data for each postulated source model;

(g) comparing the set(s) of synthetic data with the observed data thereby obtaining the source model that gives the closest fit; and

(h) outputting the position and emission rate of the at least one source assumed in the source model that gives the closest fit to obtain a representation of the position of the hydrocarbon reservoir,

wherein the concentrations of the emanations are measured by point measurements using an ultra-sensitive detector.

4. The method of claim 3 wherein the source parameters comprise the position(s) of assumed source(s) and assumed emission rate(s).